VZ COMPUTING

NEWSLETTER

AUCKLAND VZ 300/200
COMPUTER USERS CLUB

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CONTRIBUTIONS**

The following points will help those thinking of sending program's for publication in this newsletter.

If possible send a listing and a tape of your program. This helps me prepare the newsletter and the tape will be returned when I have finished.

Include some notes on what the program does and how to use it.
What is painfully obvious to the author is often obscure to we users.

For long or complex program's let me know if I can supply readers with a copy of it on tape or if you are prepared to do this yourself.
I urgently require program's and items for this newsletter.

POSTAL ADDRESS

P.O Box 1972 C.P.O AucKLAND...

CLUB NEWS JAN 1987

Welcome to the first issue of 1987.

Lets hope this year will see a much improved scene as far as VZ computer's are concerned.

Hopefully there will be more software and peripherals becoming available for user's.

*****

As promised, this issue we start the Article by Bob Kitch of AUSTRALIA . The item has 6 pages alltogether ,I have printed the first 2 pages in this newsletter and will finish the article over the next couple of issues.

If you can't wait that long ,contact me for a complete copy.

Thank's to Bob Kitch for permisson to reprint his material.

*****

For those that have written asking for the address of Video Technology limited,who manufacture the VZ computer's etc it is as follows:

"23/f; block 1,TAI PING INDUSTRIAL CENTRE
LOT No 1637,TING KOK Road,TAI PO
NEW TERRITORIES, HONG KONG.

Ihave written to V.t, But it is still to early to expect a reply.

*****

Also this issue another page from the set of Technical bulletins.

I have written to Dick smith's NZ Head office asking why these are not Available in New Zealand.

We have VZ Computer's so why not the Technical Information to use them.?

I can't wait to see what the Answer will be??

*****

This club is not Associated with Dick Smith's nor do i work for them.

The only contact I have is that I pester them.

I just wish they would provide a little more support in this country

*****

I am still getting very little Input from users ,which is a shame because the newsletter can seem pretty one sided with just my input.

If you have any information or program's send them in,it does not matter how good they are .The interrest is there and they can be work on.

Maybe you can write a small item to tell us what you do with your VZ or why you purchased a VZ in the first place.

Dick Smith Electronics

Technical Bulletin

V2-300 MAILING LIST TAPE TO DISK FILE CONVERSIONS

Below are the changes to be done to the B.A.S.I.C program to allow files to be saved on disk instead of tape for (X-7259) Mailing List program.

Once you have loaded Mailing List BREAK the program and type in the lines below pressing (RETURN) after each line.

```
1040 PRINT@162,"2. READ DATA FROM DISK";
1080 PRINT@290,"6. WRITE DATA TO DISK ";
5020 PRINT@270,"[WRITE DATA TO DISK]"
5030
5040
5050
5060
5070
5080
5110
5120
5205 ERA"MAILDATA"
5210 OPEN "MAILDATA",1:PR#"MAILDATA",DT
5230 PR#"MAILDATA",D$(N)
5240 NEXT:CLOSE"MAILDATA"
6020 PRINT@70,"[ READ DATA FROM DISK ]";
6030
6040
6050
6060
6070
6080
6100 OPEN "MAILDATA",0:IN#"MAILDATA",DT:IF DT=OTHEN6135
6120 IN#"MAILDATA",D$(N)
6135 CLOSE"MAILDATA"
7030 PRINT@199,[FUNCTION COMPLETE];
7050 SOUND 30,2:RETURN
```

Now SAVE"MAILLIST" to disk.
Type NEW
RUN below program .

```
10 OPEN"MAILDATA",1
20 PR#"MAILDATA",0
30 CLOSE"MAILDATA"
```

The above program has prepared the disk with the MAILLIST program to save and read files. The above program will never be used again.

Now you have finished just RUN"MAILLIST" and the instructions are as per old Mailing List program. The only difference is that it saves and loads files a lot faster.

Compiled by Jamie PERRY

Cnr Lane Cove & Wheelbolts Rds, North Ryde NSW 213 Ph (02) 888 3200

Hardware and software aspects of screen handling on the VZ-200/300 Part 1

Bob Kitch

This article describes the hardware aspects of the Motorola MC6847 Video Display Generator chip which is used in a number of microcomputers. Although this is an older device and lacks some of the features of newer chips, it is nevertheless a well-used device and is quite easy to interface and comprehend. To illustrate the MC6847, its use in the VZ-200 and VZ-300 computers is detailed. Additionally, some software implementations are explained and some simple hardware modifications to the VZ are given to improve screen resolution and display appearance.

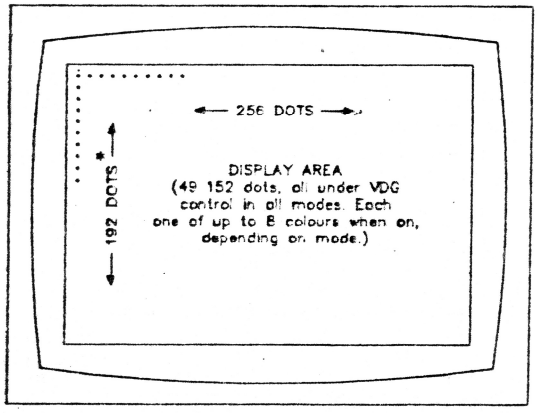
THE MOTOROLA MC6847 Video Display Generator (VDG) chip (sometimes referred to as a Cathode Ray Tube Controller — CRTC) is used to interface data read from the video RAM section of memory and to produce a modulated RF video signal or monitor output. The MC6847 is capable of operating in 14 different display modes. However, only a few of these are usually implemented in a particular installation. The MC6847 was conceived as one of the family of devices to interface with the Motorola M6800 and M68000 microprocessor families, but it can easily be adapted to other microprocessors. The VDG can be found in video games, home computers, process control displays, communications and graphics applications.

The VDG has the complex task of converting data from the screen memory into the form necessary for the raster scan display used in television and monitors. On these devices, the image is 'drawn' on the screen one horizontal scan line at a time. The 'spot' moves across the screen from right to left and its brightness or colour (chroma) is varied to produce the required display. In practice, the whole screen is built up in two passes, the first on even-numbered lines and the second on odd-numbered lines, by a process called 'interlacing' which helps to avoid flicker. The process occurs every 20 ms, or 50 half-frames are drawn every second.

Two types of VDG chip are produced by Motorola — the MC6847 for non-interlaced displays and the MC6847Y which interlaces the video display. the suffix 'P' after the device number identifies a plastic package. An enhanced version — the MC6847T1 — is also available but it is not strictly compatible with the MC6847 as it requires less external circuitry and has some additional features.

A timing or clock pulse is required to tie the scan rate and memory access cycles of the VDG in with that of the microprocessor (MPU) — otherwise chaos would reign on the bus systems! An external (to the VDG) clock is used to synchronise both the VDG and the MPU. A clock frequency of 3.58 MHz is usually selected to give the correct scan rates. If a common clock is used then often the speed of the MPU is restricted by the video display.

The format of the display area under the control of the VDG is actually 256 'dots' across × 192 'dots' down giving a total of 49 152 fundamental picture elements (pixels) under the 'control' of the VDG. Each pixel may be one of up to eight colours, depending upon the mode selected (see Figure 1.).



* One on each non-interlaced line. For interlace, the lines of the odd field are copied into the even field thus doubling the number of displayed dots

Figure 1. Typical Format of the Monitor Screen. The border is black in Alphanumeric and Semigraphic modes and green or buff in Graphic modes.

As you will have observed, the MC6847 does not utilise the entire video screen. The standard video screen consists of 262 scan lines extending across the screen, but the usable display window is offset from the top by 25 lines and extends 192 lines down the screen with a further 25 lines at the bottom being offset. Across the screen, the timing pulses are blanked-off to reduce the useable horizontal width. The linearity of images is better in the central portion of a screen and this is used by the VDG.

The screen is 'memory mapped' with each pixel on the screen being represented by a byte (or a number of bits thereof) in the video RAM. There is a one-to-one correspondence between the X-Y location of the pixel on the screen and the address of its control information in memory. The sequence of memory addresses, which are accessed to extract data to be converted to a video signal, is controlled by the VDG. The VDG also keeps track of the position of the moving spot and produces the necessary timing signals to synchronise the display to the computer. It produces, for instance, the horizon- ▶

tal sync pulse to indicate when the end of the video line has been reached so that the spot can 'flyback' to the beginning of the next scan line. This pulse also permits the MPU to access video memory during the blanking period, thereby avoiding flicker.

The decoding of the data input to the VDG is usually done by a character generator. This may be a pre-programmed, on-chip ROM in the MC6847 or an external, perhaps programmable, character generator.

The display modes that the MC6847 may operate in are set out in Table 1. this tabulation summarises much of the information about the VDG chip. The way in which these features are selected is in-line with most digital devices. The pin assignment diagram for the MC6847 is shown on Figure 2. The chip is an N-channel, silicon gate device with most signals being TTL compatible. The device is housed in a 40-pin DIL package. The amount of memory required by the various display modes is a trade-off against element size or resolution of the display in pixels. This feature will become more apparent later.

The lines into, or out of, the VDG can be grouped into six classes but classes i) to iv) are the most important to this discussion.

i) **Address Lines.** (DAO — DA12) These permit up to 8K of video memory to be directly addressed, although only 6K is ever required. The absolute location of the video memory in the computer system will depend upon the address decoding used. The starting address is located at the upper left-hand corner of the screen. The activity of the address lines is regulated by the *MS pin and the display mode selected.

ii) **Date Lines.** (DDO — DD7) These are used to input values in RAM memory to be mapped onto the screen. The values are decoded within the chip with repsect to shape, luminance and chroma (see later).

iii) **Mode control Lines.** There are eight important lines into the VDG which control the 14 display modes. These are detailed in Table 1. Three major types of display may be selected: (a) Alphanumerics, (b) Semigraphics and, (c) Graphics.

The implementation of these displays within the VDG is quite different in each case.

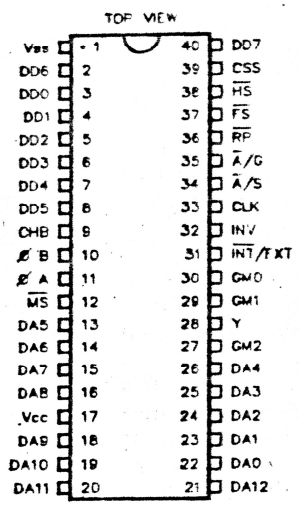


Figure 2. Pin-out for Motorola MC6847 Video Display Generator chip as used in the VZ computers.

Switching the screen to Alphanumerics or Graphics mode is determined by the (*A/G) line.

Switching the screen between Alphanumerics or Semigraphics mode is set by the (*A/S) line.

Selection of the internal (on-chip) or external character sets held in ROM is set by the (*INT/EXT) line. In Semigraphics mode this line determines whether SG4 or SG6 mode is selected.

Normal or inverse Alphanumeric displays are set by the (INV) line. Three lines (GMO, GM1, GM2) are used to select one-of-eight Graphics modes to be used.

An eighth control line (CSS) selects the colour set to be used in the particular mode selected. Most modes have two colour sets available.

In Alphanumeric and Semigraphics 4 modes, one-of-two background colours is selected and in Semigraphics 6 and Full Graphics modes one-of-two colour sets is selected.

The operating mode of *A/S, *INT/EXT, CSS and INV may be changed on a character by character basis in Alphanumerics and Semigraphics mode.

TABLE 1:
SUMMARY OF DISPLAY MODES FOR MC6847 VDG

	colours available	bytes video RAM	memory mapping	element size	Control Lines *A/G	*A/S	*INT/EXT	INV	GMO	GM1	GM2
Four ALPHANUMERIC Display Modes											
i) Internal ROM Alphanumerics	2	512	byte	BX12	0	0	0	0	x	x	x
ii) Internal ROM Alphanumerics — Inverted	2	512	byte	BX12	0	0	0	1	x	x	x
iii) External ROM Alphanumerics	2	512	byte	BX12	0	0	1	0	x	x	x
iv) External ROM Alphanumerics — Inverted	2	512	byte	BX12	0	0	1	1	x	x	x
Two SEMI-GRAPHIC Display Modes											
v) 32 by 16 Semigraphics 4 (SG4)	8	512	byte	BX12	0	1	0	x	x	x	x
vi) 32 By 16 Semigraphics 6 (SG6)	4	512	byte	BX12	0	1	1	x	x	x	x
Eight GRAPHIC Display Modes											
vii) 64 by 64 Colour Graphics One (CG1)	4	1024	2 bit	3x4	1	x	x	x	0	0	0
iix) 128 by 64 Resolution Graphics One (RG1)	2	1024	1 bit	2x3	1	x	x	x	0	0	1
ix) 128 by 64 Colour Graphics Two (CG2)	4	2048	2 bit	2x3	1	x	x	x	0	1	0
x) 128 by 96 Resolution Graphics Two (RGZ)	2	1536	1 bit	2x2	1	x	x	x	0	1	1
xi) 128 by 96 Colour Graphics Three (CG3)	4	3072	2 bit	2x2	1	x	x	x	1	0	0
xii) 128 by 192 Resolution Graphics Three (RG3)	2	3072	1 bit	sx1	1	x	x	x	1	0	1
xiii) 128 by 192 Colour Graphics Six (CG6)	4	6144	2 bit	2x1	1	x	x	x	1	1	0
xiv) 256 by 192 Resolution Graphics Six (RG6)	2	6144	1 bit	1x1	1	x	x	x	1	1	1

The IEEE standard for electrical state relationships uses the suffix '' instead of the overber '—' to designate when an electrical signal is active low.*

Inside the VZ200

After a good look at the memory map of the VZ200 I have found many a similarity between it and the TRS-80 (MkI & III Level II). As most of you should know, TRS-80 programs are easily transfered to VZ Basic. If one looked at the TRS-80 memory map they would find that certain memory sections are similar to the VZ's except that they are in different positions. After further checking I found that one could convert memory locations of the TRS to the VZ in the following way.

ROM - all these locations need no conversion but checking is advised.

I/O area - add 12K (12288) or 3000H

Video Ram - add 13K (13312) or 3400H

Reserved Ram - add 14K (14436) or 3800H

One will notice that with the 16K Ram pack, 12K of expansion Ram is still available so the total ram possible for the VZ is 36K. Also, some of us have heard of the possibility of a 64K amount of ram but this not possible. The Z80A can only address 65536 locations so the total ram and rom combined in VZ being 52K (including 16K Ram pack) means 65K ram is not possible.

~~For anyone who wishes to know how the TRS-80 and VZ200 compare in more detail see one of the committee members.~~

Hereeare the details of the System Variables from decimal locatiens 30862 to 30976. (788FH - 7800H)

DECIMAL ADDRESS	FUNCTION
30862/3	address of USRO subroutine
30864/5/6	3 bytes used in RND computation
30867/8/9	INP routine
30870/1/2	OUT routine
30873	INKEY$ storage
30874	ERR storage
30875	Printer column position
30876	Device routine flag(-1=tape 0=video 1=printer)
30877	Display Line Length(still holds trs-80 64 cols)
30878/9	Video Display Width(hi-res trs-80 48)
30880/1	End of Basic Stack
30882/3	Current Line Number
30884/5	Start of Basic Storage
30886	Line Cursor Position, used for TAB(
30887/8	Address of Keyboard Buffer
30889	Cassette Input Flag (0=tape)
30890/1/2	Random Number Seed
30893	Unused
30894	Variable create/locate flag, used for DIM/LET
30895	Number type flag:2=integer 3=string 4=single 5=double
30896	Data type flag during text encoding
30897/8	TOM - top of string space
30899/900	Pointer to next available string space
30901-30933	String Pointer Workspace (33 bytes)
30934/5	Pointer to next string location
30936/7	Position Flag (4 uses)
30938/9	Line Number during Data Scan
30940	Active FOR Flag
30941	Input Text Flag

PTO

CONT.

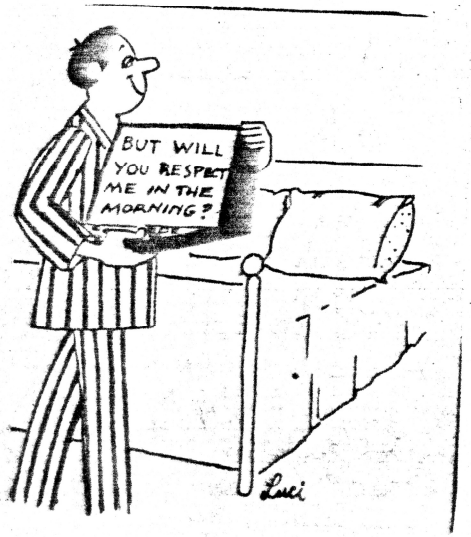
30942	Read/Input Flag (z=input), or PRINTUSING delimiter
30943/4	Basic Program or pointer to result var. in evaluation.
30945	AUTO Flag (nz=on)
30946/7	AUTO current line number
30948/9	AUTO line increment
30950/1	Encoded statement pointer
30952/3	Stack pointer Pointer
30954/5	Error line during RESUME
30956/7	"Current" line number , used by EDIT
30958/9	Saved position before error, used by RESUME
30960/1	Address of ON ERROR
30962	Error Trapping Flag (nz=in trap now)
30963/4	Address of decimal point in ASCII conversion
30965/6	Last line executed, used by CONT
30967/8	Last byte executed, " " "
30969/70	EOF/VLT Simple variables pointer
30971/2	Arrays pointer
30973/4	Start of Free memory
30975/6	Data pointer

POKE 20863,200	- mode change, press key for MODE(0)
POKE 30723,17	- enter a command, see what happens
POKE 30723,198	- as above

VZ-Memory Map

0	-	16383	Operating system and BASIC ROM
16384	-	26623	Reserved for cartridges (like the Wordprocessor)
26624	-	28671	Input/Output buffer
28672	-	30719	Video display area
30720	-	32767	User RAM
-32768	-	-1	User RAM

Hint by M Novakov



```
1 REM *************
2 REM * ROAD RACER *
3 REM *     BY     *
4 REM * PAUL CLARK *
5 REM *************
10 POKE30744,1
20 CLS:POKE30744,1
30 W=32:P=12:M=6:COLOR5,0
40 R$="N":Z=8
50 L$="C"
80 PRINTTAB(INT(W/2-7));"<<ROAD RACER>>"
90 PRINT
100 PRINT"YOU ARE DRIVING IN THE ROADRAC
ER"
110 PRINT@96,"RUN. YOU USE C FOR LEFT AN
D N   FOR RIGHT"
130 PRINT"IF YOU GO OFF THE TRACK YOU WI
LLLOOSE A CAR."
131 PRINT"YOU HAVE 6 CARS IN THE RACE."
132 PRINT"AS YOUR  SCORE ADVANCES ";
133 PRINT"BY 400, THE TRACK GETS  SMALLE
R."
135 PRINT:PRINT"    PRESS <<SPACE>> TO S
TART":POKE30776,0
140 K$=INKEY$:I$=INKEY$:IFI$<>" ",140
141 CLS:T=W/2-P/2
145 C=T+(P/2)+1
150 A$=CHR$(143):COLOR5,0
151 PRINT@203,"JJJJJJJJJ"
155 PRINT@203+32,"J2J2J2J2J"
160 PRINT@203+64,"JJJJJJJJJ"
161 FORI=1TO500:NEXT
165 COLOR2:PRINT@203+33,A$:SOUND1,3:FORL
=1TO500:NEXT
170 PRINT@203+33,CHR$(176)
175 PRINT@203+35,A$:SOUND1,3:FORL=1TO500
:NEXT
180 PRINT@203+35,CHR$(176)
185 PRINT@203+37,A$:SOUND1,3:FORL=1TO500
:NEXT
190 COLOR1:PRINT@203+37,CHR$(176)
195 PRINT@203+39,A$:SOUND5,9:FORL=1TO100
0:NEXT:CLS
198 PRINT@480,;:COLOR5
202 IFJ=400,GOSUB380
204 IFJ=800,GOSUB380
206 IFJ=1600,GOSUB380
207 IFJ=2400,GOSUB380
208 IFJ=3000,GOSUB390
210 PRINTTAB(T);CHR$(159);TAB(C);CHR$(12
5);TAB(T+P);CHR$(159)
220 X=RND(2):IFX=1ANDT>2,T=T-1ELSEIFX=2A
NDT+P<W-2,T=T+1
260 IFINKEY$=L$,C=C-1
270 IFINKEY$=R$,C=C+1
275 IFINKEY$=" "ANDT>5,277
276 GOTO280
277 PRINTTAB(0)JTAB(T)CHR$(143)TAB(C)"="
TAB(T+P)CHR$(143):GOTO280
280 IFC<T,310
290 IFC>P+T,310
295 IFM=0,350
300 J=J+1:GOTO202
310 FORI=1TO4
320 SOUND31,1
330 NEXT:M=M-1
340 IFC<TTHENC=C+3ELSEIFC>P+TTHENC=C-3
345 GOTO202
350 CLS:PRINT"YOUR SCORE WAS";J;"."
355 PRINT"PRESS ANY KEY TO PLAY AGAIN"
360 DATA1,2,3,4,5,6,7,8,9,8,7,6,5,4,3,2,
1,31
370 FORL=1TO18:READZ:SOUNDZ,1:NEXT
375 K$=INKEY$:I$=INKEY$:IFI$="",375
376 RUN
380 P=P-1:SOUND31,1:RETURN
390 CLS:COLOR5:M=4
400 PRINT"JZJZJ
410 PRINT"ZJZJZ
420 PRINT"JZJZJ
510 PRINT@5,"YOU ARE THE OFFICIAL WINNER
"
520 PRINT@5+32,"OF THE INTERNATIONAL"
530 PRINT@5+64,"<<ROAD RACER>> CHAMPION'
S"
550 DATA 1,2,3,4,5,6,7,8,9,8,7,6,5,4,3,2
,1,31
560 FORL=1TO18:READZ:SOUNDZ,1:NEXT
570 FORL=1TO500:NEXT
580 PRINT"  PRESS <<SPACE>> TO RE-START.
700 K$=INKEY$:I$=INKEY$:IFI$<>" "THEN700
ELSERUN
1000 'REPLACE ALL J'S IN THE QUOTES WITH
 ITS' GRAPHIC SYMBOL
```